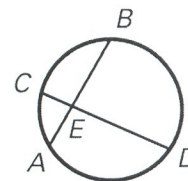


- Goals**
- Find the lengths of segments of chords.
 - Find the lengths of segments of tangents and secants.

THEOREM 10.15

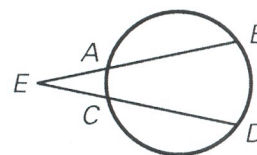
If two chords intersect in the interior of a circle, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord.



$$EA \cdot \underline{\hspace{1cm}} = EC \cdot \underline{\hspace{1cm}}$$

THEOREM 10.16

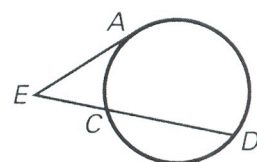
If two secant segments share the same endpoint outside a circle, then the product of the length of one secant segment and the length of its external segment equals the product of the length of the other secant segment and the length of its external segment.



$$EA \cdot \underline{\hspace{1cm}} = EC \cdot \underline{\hspace{1cm}}$$

THEOREM 10.17

If a secant segment and a tangent segment share an endpoint outside a circle, then the product of the length of the secant segment and the length of its external segment equals the square of the length of the tangent segment.



$$(\underline{\hspace{1cm}})^2 = EC \cdot ED$$

Example 1 Finding Segment Lengths

Chords JN and KM intersect inside the circle.

Find the value of x .

$$LJ \cdot LN =$$

$$10 \cdot x =$$

$$10x =$$

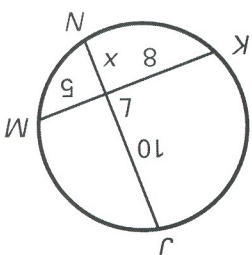
$$x =$$

Divide each side by 10.

Simplify.

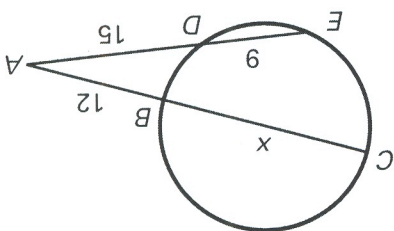
Substitute.

Theorem



Example 2 Finding Segment Lengths

Find the value of x .



Solution

$$AB \cdot AC = AD \cdot AE$$

Theorem

$$\cdot (x + \quad) = 15 \cdot (\quad + \quad)$$

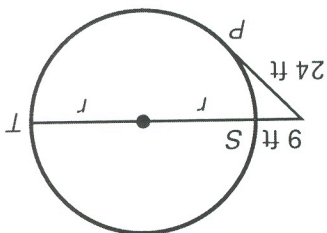
Substitute.

Simplify.

Solve for x .

Example 3 Estimating the Radius of a Circle

You are standing at a point Q , about 9 feet from a large circular tent. The distance from you to a point of tangency on the tent is about 24 feet. Estimate the radius of the tent.



Solution

$$(QP)^2 = QS \cdot QT$$

Use Theorem

$$2^2 \approx 9 \cdot (\quad + \quad)$$

Substitute.

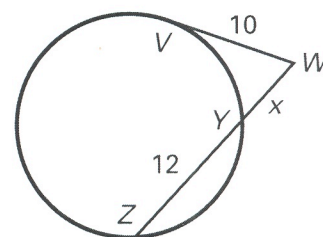
Simplify.

Subtract \quad from each side.

Divide each side by \quad .

Answer So, the radius of the tent is about \quad feet.

Use the figure at the right to find the value of x .



Theorem 10.17

Substitute.

Write in standard form.

Use Quadratic Formula.

Simplify.

$$(\quad)^2 = WY \cdot \quad$$

$$\quad^2 = x \cdot (\quad + \quad)$$

$$0 = \quad^2 + \quad - \quad$$

$$x = \frac{-\quad \pm \sqrt{\quad^2 - 4(1)(\quad)}}{2}$$

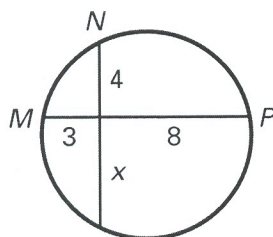
$$x = \quad \pm \quad$$

Use the positive solution, because lengths cannot be negative.

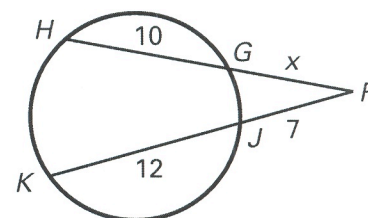
Answer So, $x = \quad + \quad \approx \quad$.

Checkpoint Complete the following exercises.

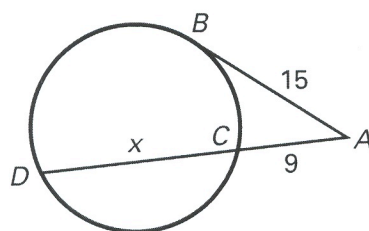
- 1.** Chords MP and NQ intersect inside the circle. Find the value of x .



- 2.** Find the value of x .



- 3.** Find the value of x .

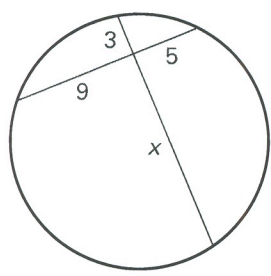


Practice A

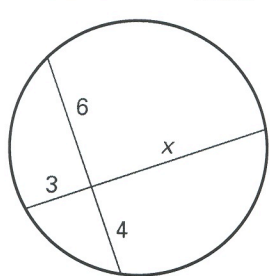
For use with pages 629–635

Fill in the blanks. Then find the value of x .

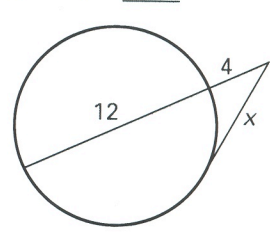
1. $x \cdot \underline{\quad ? \quad} = 5 \cdot \underline{\quad ? \quad}$



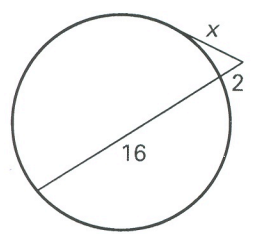
2. $6 \cdot \underline{\quad ? \quad} = 3 \cdot \underline{\quad ? \quad}$



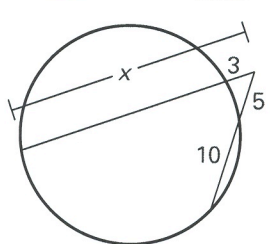
3. $x^2 = 4 \cdot \underline{\quad ? \quad}$



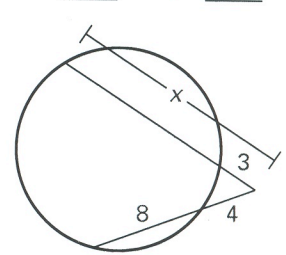
4. $x^2 = 2 \cdot \underline{\quad ? \quad}$



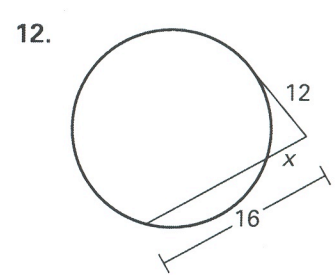
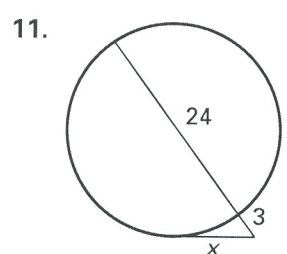
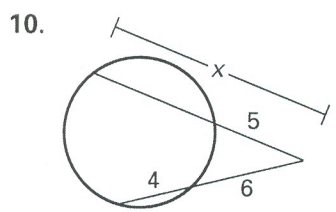
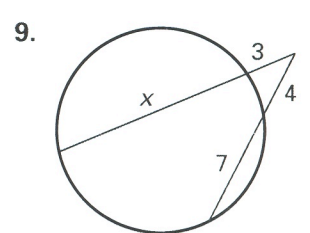
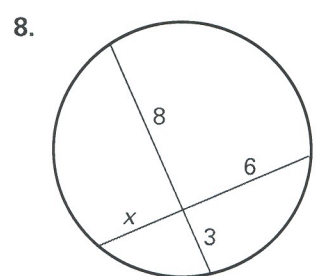
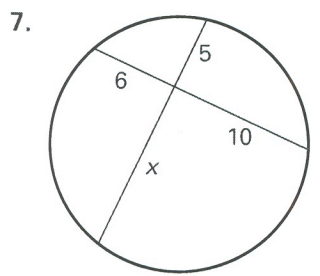
5. $3 \cdot \underline{\quad ? \quad} = 5 \cdot \underline{\quad ? \quad}$



6. $3 \cdot \underline{\quad ? \quad} = 4 \cdot \underline{\quad ? \quad}$



Find the value of x .



Use the diagram at the right and the given information.

13. **Water Tank** You want to estimate the radius of the town's circular water tank. You stand at point C, about 6 feet from the circular tank. The distance from you to a point of tangency on the tank is about 10 feet. Estimate the radius of the tank.

